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To:

The Editor
NATURE
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Dear Editor,

During the past decade China has witnessed unprecedented boom in research on paranormal phenomena stimulated by a massive public interest in Qigong - the ancient form of meditation and exercises. It was a firm conviction of the Chinese scientific community that any serious study of this subject would simply expose clever tricks of a handful of charlatans who inspired the wave of superstition among the common people. But this time it was the scientists who were proven initially wrong. Scores of scientific results were published, mostly in Nature Journal - a highly respected Chinese parallel of your magazine, all confirming existence of phenomena running contrary to our present knowledge of Physics. This research came from the most prestigious Chinese institutes: Institute of Space Medico-Engineering, China Institute of Atomic Energy, etc.

It is very unfortunate that this wealth of puzzling results and experimental data is unknown and unavailable to the Western scientists. To help correct this situation we have written a 4900 words article that not only gives the readers a first hand report about one of such most unusual experiments but also provides necessary introduction and background information. We think that it is very important that article like ours be published in one of the credible, wide circulation scientific magazines, just like NATURE. Otherwise, nobody will believe that what we are writing about is true and the whole point of publishing this information will be lost.

We understand that in the present form our text may not yet be well suited to appear in NATURE and we would welcome any suggestions to rearrange or shorten it.

Sincerely,

Billings
W. Tech

Dr. Qingli Li (born 1941) is associate professor of physics at China Institute of Atomic Energy (IAE) in Beijing, China. He was a visiting scientist at the University of Pennsylvania and at the Indiana University Cyclotron Facility. Dr. Li is currently a visiting scientist at Cyclotron Institute, Texas A&M University. His main research interests are in experimental nuclear and high energy physics. Dr. Li has published about 40 articles on nuclear physics, also in American and European Scientific magazines. His publications have brought him several awards from his Institute and from the Chinese National Science and Technology Committee. He is also one of the co-authors of the Chinese Encyclopedia of Physics (Chapter on nuclear physics). Between 1986-1989, together with six other senior scientists from IAE, Dr. Li was involved in research on qigong and related paranormal phenomena.

Dr. Władysław H. Trzaska (born 1955) graduated from Warsaw University, Poland, and from University of Jyväskylä, Finland (Ph. D. in experimental nuclear physics). His fields of interest include electron, positron, and gamma-ray spectroscopy, development of new instruments and methods for nuclear research, and software development. Dr. Trzaska has been actively involved in nuclear and high energy physics research at Argonne, Brookhaven, and Los Alamos National Laboratories, at Purdue University, at Texas A&M (where he is currently a visiting scientist), and at the University of Jyväskylä (his permanent affiliation). He has published nearly 30 research papers in major scientific magazines.

* Annual IAE award

** Chinese National Science and Technology Committee award

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Qingli Li and W. H. Trzaska

(Contains approximately 4900 words)

Abstract:

During 1980s an extensive amount of experimental data has been collected in China documenting the whole range of strange phenomena that have been linked to the ancient practice known as qigong. These experiments are of fundamental importance to the scientific community because they contradict our present understanding of physics. One of such experiments is described in detail, preceded by brief description of qigong. The aim of this article is to focus the attention of the scientists on the puzzling discoveries made in China and to stimulate cross-disciplinary, coordinated effort that may lead to the new scientific revolution surpassing even the breakthroughs of the first half of the XX century. On top of its challenge to physics qigong has already made an important impact on traditional medicine by providing seemingly miraculous ways to heal and a simple yet effective set of preventive exercises.

Introduction

Far East, and especially China, have preserved to this day many useful skills and practices, developed and perfected over millennia, that only now are gaining recognition in the West. Not long ago a report about achieving, by means of inserting skin-deep a few tiny needles into the patient's body, a sufficient degree of anesthesia required to perform appendectomy would meet with laugh and total disbelief. Yet, at present, nobody laughs at acupuncture any more. This ancient art of healing is slowly but steadily gaining world-wide replication even though we are still far from the full understanding on how and why it works.

Over a decade now has passed since China emerged from the disasters of the cultural revolution. With a gradual departure from the strict doctrine and the rigid traditional view-point, China moved toward a more open society. With the mechanism of repression eased, people who once feared to show their unusual abilities are more open in their practices. Those in turn, uncensored by the media, lead to new discoveries and stimulate public interest. By the end of the 1980s there were already some 20 million Chinese practicing qigong. Most of them working towards small improvements of their mental and physical health with modest but noticeable degree of success. There is however a handful of well-known qigong masters displaying well documented abilities that are indeed beyond anyone's comprehension. At

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first, lets leave these extreme cases away and concentrate on more common aspects of qigong.

Brief description of qigong

It is very difficult to give any modern theory or even a consistent description of qigong. Clearly, this 2,500 year old practice is documented in a way very foreign to the scientific vocabulary to which we are used to. There are also various schools of qigong stressing different forms of practice to achieve specific results.

In general qigong concerns the flow of a certain substance called *qi* (hence qigong - the *qi* ability). A steady flow of this substance in the human body insures good health and internal happiness. By channeling *qi* into a person through the "meridian channels" that, incidentally, coincide with those of acupuncture, illness or malfunction can be cured. Steady flow of *qi* can be obtained by daily concentration and balancing exercises accompanied by a slow motion of the arms, legs and the whole body. At some point of such regular practice, typically several months later, the adept will start moving on his own, without an apparent intent. Just as if the limbs would know themselves how to move, independent of the brain. This is the second stage of qigong practice. Yet more practice gives the ability to elevate

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oneself on a regular and controlled basis into a meditative state. A strange condition that can be described as a feeling of freshness, energy and serenity. Transforming oneself, even for a few minutes, into the meditative state helps to fight fatigue, hunger, pain, sleepiness. At the same time, if performed just before intended rest, it assures a deep and regenerating sleep. This third stage of qigong can be reached with the total amount of effort and practice comparable with learning and mastering of a new sport - swimming, horse riding or tennis. Similarly as with sports, the earlier in your life one starts, the faster the progress and the better the results.

Apparently, some people produce qi in sufficient abundance to be able to emit it. Depending on the magnitude of such emission we can try to estimate the likelihood of this ability at something between few in a hundred to few in a million. People known to emit qi are called qigong masters. A qigong master can help a new adept to go directly to the second stage of qigong practice without the long months of tedious exercise.

Even if it were no more to qigong than something of an alternative to other fitness exercises, it is well worth popularizing as it stresses the neglected side of our strive toward a healthy life style. Qigong can be as beneficial to our often racked nerves as jogging is to our hearts and lungs. In that sense this newly rediscovered practice can be compared to

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yoga although it is easier to exercise than difficult stretching postures of its Indian counterpart.

The fast growing popularity of qigong in China has been accelerated by the fame of a few individuals capable of performing various supernatural tasks ranging from healing to psychokinesis. These supernatural abilities were tested in various elaborate experiments and are well documented in Chinese scientific journals [1-10].

Mr. Zhang Baosheng

Born in 1955 in Naging, Zhang Baosheng received some basic education and worked in a local factory. Apparently he did not distinguish himself in any way until one day, when handing to the coworker a letter, he casually mentioned what is written in it. Angry coworker, suspecting the message from his girl-friend has been steam opened, read, and resealed, complained to the manager. When confronted with the supervisor, Zhang Baosheng seemed sincerely surprised that not everybody can read through the cover and immediately demonstrated his ability by telling the contains of a closed business file picked at random by the baffled manager.

Since that event in 1976 Zhang Baosheng's abilities were

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scrutinized by various committees and institutions including China's prestigious Institute of Space Medico-Engineering (ISME) where he is currently employed. His extraordinary skills allow him, among other, to remove small objects including live, marked insects from a sealed bottle, burn cloth with a touch of his hands or fingers, restore a torn card, or write a message on a paper sealed in a box. Countless tests were performed, all under tightly controlled conditions, and their results published without a single account of an attempted fraud. The bulk of evidence includes a 400 frames per second photographic documentation showing a marked medical pill penetrating glass (without destruction neither of the glass, nor of the pill).

In fact, the authorities from ISME have total control over the access to Mr. Zhang Baosheng. His employment at the defense related institution means that even the most senior Chinese scientist are required special permission to approach Mr. Zhang. Similarly, only by submitting research proposals is it possible to suggest new means of studying his abilities. Actually, proposals aimed exclusively at checking with yet more refined techniques whether his accomplishments are faked are not being approved any more. With all the evidence in place the present experimental effort concentrates on the mechanism of these unexplained phenomena.

Experiment

The experiment that was done on July 10, 1988 at the China Institute of Atomic Energy belongs to this second category of experiments. Although precautions were taken to rule out any foreseeable tricks, the main goal was to look for possible microscopic alterations in the sample and obstacle materials involved in the already well proven psychokinetic penetration effect. The main results of this experiment, initiated and supervised by one of the authors of this article (Dr. Li), are published [11] in Atomic Energy Science and Technology (in Chinese). This time, we shall try to provide more details and some background information that may be helpful to a reader unfamiliar with qigong and related phenomena.

Mr. Zhang arrived at the Institute accompanied by Prof. Chen Hsin - the director of the ISME and a renowned specialist in somatic science research. The tests were done in a small lecture room filled with over 30 spectators. At the front Mr. Zhang and the senior investigators were seated at the table facing the audience. Dr. Li was seated right next to Mr. Zhang. Neither the place, nor any of the items used in the tests were even seen by Mr. Zhang before.

Envelope test

At first, Mr. Zhang's clairvoyance abilities were tested by showing him a sealed business envelope. In the envelope there were four Chinese characters written with a red, fine point permanent marker on a transparent, 2 mm thick polyester foil. After writing, the text was covered by a 0.5 mm thick trace detector that looks like a common red translucent foil. Both foils were taped together making the red text invisible under the red foil. The only person who knew the text and the content of the envelope, prepared in advance, was Dr. Li.

Upon presentation, Mr. Zhang gave a proper description of the content of the envelope as two rectangular pieces of foil, one of them red, held together in four corners by adhesive tape. He also said that there were 4 red characters written on the foil but he could not see them clearly. In his attempts to guess he wrote four characters out of which the first two were correct. Then, he crossed over and wrote another four characters. This time only the third one was correct. Finally, he gave up saying again that he could not see clearly.

Next, Mr. Zhang folded one of the edges of the envelope, sufficiently to cover a small coin, and handed it to one of the scientist (Dr. Chen). The latter, after ensuring that the coin is indeed in the fold and not in the envelope, held it visible to

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all the present. After a short pause (some 30 seconds) Mr. Zhang said "O.K." and, indeed, the coin, still held by the scientist's fingers under the folded edge, was no longer outside but inside the envelope.

Mr. Zhang is known to be able to transfer characters written on an envelope into the paper that is inside the envelope. Previous tests showed that the ink characteristics, both of the original and the transferred characters, always match. This time, the use of polyester foils was intended by Dr. Li to make such a transfer impossible since ball pen ink can not adhere to the type of foil that was used. Not being aware of that, Mr. Zhang proceeded by writing three short sentences on the envelope and, after a brief concentration, announced that the text has been transferred.

Before being cut open with scissors, the envelope was scrutinized in turns by several investigators for possible signs of tampering but none were found. The coin and the foils were retrieved from inside. The three sentences were indeed written inside. However, not on the foils but, reduced in size and not altered in shape, on the pieces of Scotch Tape holding the foils together.

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Destruction of a watch

There is a degree of childishness in Mr. Zhang's behavior. It manifests itself in his demands, in the middle of the test, for food (knowing that a festive banquet, prepared in his honor, is awaiting anyway), or in the desires to demonstrate some of his mischievous abilities. One of them was a wish to brake a watch. Dr. Li immediately surrendered his own for that purpose - a mass produced, mechanical watch; "Beijing" brand. Dr. Li was asked to hold the watch inside his clasped fist. As Mr. Zhang concentrated, Dr. Li felt intense heat originating from the watch. Next, Mr. Zhang made a gesture as if he were picking up a hair from Dr. Li's skin, on the back of his closed palm, between the thumb and the index finger. To everyone's astonishments, what Mr. Zhang picked up was not a hair but a minute hand. In the same fashion he extracted also a second hand and an hour hand. This process was slow enough that all the present could clearly see the hands emerging from Dr. Li's skin. Dr. Li did not feel any pain or other sensations associated with the parts piercing his hand. It was the first documented event of an object penetrating human body in such a fashion.

"The watch's glass is broken." Stated Mr. Zhang. Indeed, when Dr. Li opened his hand there was a clear gap running across the length of the glass. From the condition of the edges it appeared that the damage was inflicted by partial melting of the

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organic glass. All three hands were missing and there were deep scratches on the metal back of the watch, as if someone would use a file on it, but the mechanism of the watch was still ticking.

Burning of a shirt

Another of Mr. Zhang's spontaneous actions was his wish to burn cloth. It created an uneasy situation as no clothing was prepared for such eventuality and, because of a hot weather and lack of efficient air conditioning, nobody had any excess garments. Ultimately, one of the investigators (Dr. Du) simply took off his white, polyester shirt and handed it to Mr. Zhang. Mr. Zhang put the shirt on the table and touched it with his hand. At that time smoke came out of the fabric and a number of black, burned spots appeared. Using his thumb, Mr. Zhang touched the fabric in a few more places creating each time burned spots. It created an impression among the audience as if Mr. Zhang had too much energy and wanted to dispose of it. It also appeared that Mr. Zhang does such "tricks" as a compensation when he is not able to achieve a 100% success in other tests.

Description of bottles and samples

The main goal of the experiment was to study possible structural changes in objects involved in psychokinetic tests. It

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was suspected that atoms of the penetrating object might leave some traces in the obstacle material that, in turn, could be revealed by tracing detectors - a technique used frequently in the past in nuclear physics. A typical detector looks like an ordinary plastic foil. When an atom moves through the foil it loosens, due to its motion, some of the surrounding electrons. Such an ionized object inflicts microscopic damage along the trace of its passage. After exposure, this damage can be enlarged by chemical etching and viewed under a microscope.

Two bottles were prepared. The bigger one, made of clear glass, was approximately 14 cm high, 22 cm in diameter. It was a standard bottle used in hospitals for transfusions of saline solution. It can be distinguished by a tight rubber plug with a long rubber skirt that folds out on the bottle's neck providing a firm and difficult to remove lid. Inside the bottle were: a pellet containing a radioactive α source ($1\mu\text{Ci } ^{241}\text{Am}$), an α -Fe Mössbauer absorber, two pieces of high temperature superconductor samples, four pieces of trace detector material (each about 2mm thick), a metal sample, a small, 3cm by 1cm ampule containing a liquor sample, ten yellow and ten white medical tablets, and an ordinary bolt nut. A thin cotton thread was tied to the nut. The other end of the thread extended outside the bottle, between the rubber plug and glass, and was tied to the bottle's neck. The fragile superconducting samples were wrapped and sealed in several layers of the trace detector foil.

The smaller bottle, measuring 8cm (height) by 5cm (diameter), was made of clear plastic and had a plastic screw-on lid. In the bottle there was a sealed pouch made of a transparent, foil-like trace detector material. From the outside the foil was practically invisible as it seemed to be part of the bottle's walls. Any objects emerging from the inside would have to pass not only through the sides of the bottle but also through the layer of the trace detector. Inside the sealed pouch in the plastic bottle there were 10 yellow tablets and 6 white tablets of vitamin C, and a tungsten sample.

Penetration of the bottles

Mr. Zhang asked one of the investigators (Dr. Du) to hold the larger (glass) bottle in both hands. Without himself touching the bottle, Mr. Zhang held the investigator's wrists. After about 10 minutes of deep concentration a white Vitamin C dropped to the table from the bottom of the bottle. Two yellow tablets followed the same way. Next, pieces of superconducting material emerged from the side wall succeeded by already empty but still sealed plastic wrapping. In a similar fashion solid pieces of the trace detector and all the other objects were extracted from the bottle with the exception of the liquor sample, radioactive source, and the nut with the attached cotton thread.

At some point during the test Mr. Zhang apparently attempted to extract the nut from the bottle. At that time, entire length of the thread became visibly stiff. About 3 or 4 cm of the thread emerged from under the tight rubber plug before the cotton fiber lost its stiffness and Mr. Zhang gave up attempts to extract it any more.

Mr. Zhang made later an interesting remark on why he did not extract the radioactive source and the liquor sample (he was not told about the nature of this objects). He said he did not want to try because he did not like them. He did not like the "smell" of them.

After a next period of concentration, Mr. Zhang asked for permission to touch the plastic bottle, already held by the investigator (Dr. Du), and, without inverting, shook it in a gesture similar to shaking salt out of a salt shaker. As the result most of the tablets came out, together with the tungsten sample. Immediately inspected, neither the bottle, nor its seal, nor the plastic pouch showed any damage or alteration.

Analysis of the samples

Regretfully, none of the powerful modern methods capable of detecting minute changes in the microscopic, molecular, atomic

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and nuclear structure of the matter were able to provide any clues to the puzzling phenomena demonstrated by Mr. Zhang. A detailed analysis of all the specimens involved in the tests (including those that failed to emerge from the bottles), was performed; each failing to give any insights to the mechanism of the penetration phenomena. The trace detectors showed no traces other than previously induced traces. The properties of the superconducting samples did not change. The Mössbauer spectrum of the α -Fe absorber was not altered. Surface studies with electron microscope did not reveal any induced abnormalities. The α spectrum of the radioactive source and the gas chromatogram of the liquor sample overlapped with those done prior to the experiment.

Odds for illusion

Clearly there are many skillful illusionists who, with an aid of a favorable viewing angle, some prearranged requisites, and, often, a trained assistant, are capable of deceiving our perception in stunts, not unlike those demonstrated by Mr. Zhang. None of this aids, however, were available to Mr. Zhang; neither this time, nor in countless previous tests. As an employee of ISME he remains under constant surveillance and acquisition by him of any stunt material would not pass unnoticed. Also, even the best illusionists have their bad days and are, occasionally,

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"caught" by someone in the audience. In contrast, there is not a single case when it would happen to Mr. Zhang. People who know him personally consider him very honest and sincere; not capable of cheating.

One may wonder whether Mr. Zhang is apt of hypnotizing large groups of people making them believe something that did not happen. But, besides the fact that such an ability would already be very remarkable in itself, it is hard to imagine somebody generating a 400 frames per second photographic evidence by the power of his will.

Link with qigong

There is an interesting link between individuals possessing unusual, inborn gifts - like Zhang Baosheng - and many ordinary people practicing qigong on a daily basis. By monitoring electrical and chemical activity of the human body two distinct phases can be differentiated - that of sleep, and that of being awake. When the same relatively standard test, involving some 30 parameters (electrocardiogram, electroencephalogram, pulse phase, etc.), is applied to a qigong adept who is in a meditative state, the measurements do not coincide neither with those of "sleep", nor those of "awakeness". Clearly, a person advanced in his qigong exercises is able to put himself into a strange, yet well

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detectable, condition. This condition may be regarded, next to sleep and the normal state of consciousness, as the third fundamental phase of daily human activity.

As we have mentioned describing the tests with Mr. Zhang, before each task he has to concentrate, sometimes as long as 30 minutes. Previous neurological and somatic measurements have shown that during such concentration periods his condition is very similar to that of the meditative state in qigong practice. This observation coincides with claims by many qigong experts that once they have mastered reaching meditative state they have also acquired some, usually limited, paranormal abilities. It has been established that after special qigong training a noticeable percentage of people can possess such abilities.

One of the more spectacular examples is Mr. Chao Chey Zhoun - previously an ordinary worker at one of Beijing factories. After qigong training he developed mental telepathy and clairvoyance skills as well as ability to diagnose and cure some diseases. He is known to see people's interior "like on an X-ray picture" and can distinguish in this way malfunctioning body organs from the healthy ones [12].

Power to heal

Dr. Yan Xin is perhaps the most famous qigong master. Born

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in 1950, he started practicing qigong in early childhood. A graduate of Chengdu Traditional Chinese Medical College he has been very successful at seemingly miraculous cures of his countless patients. In 1986 his fame brought him to Beijing where, in front of a medical council, he proved his gifts by fully restoring a broken bone. A patient with a multiple fracture, clearly documented on an X-ray picture, was brought to Dr. Yan. After a short chat with the patient Dr. Yan declared that the bone is now cured and, indeed, the patient felt fine and subsequent X-ray pictures did not show any traces of the previous damage.

Dr. Yan's abilities are clearly outstanding but not unique, there are many qigong masters who, by emission of qi, routinely speed up the recovery of a broken bone from few month to just weeks or less.

What is qi

The mysterious substance that seems to be at the core of all this unusual phenomena still remains a mystery. Chinese scientists, using arrays of modern detectors, tried to monitor emissions originating from qigong masters. They met with partial success by detecting increased levels of infrared radiation. Interestingly, the emission oscillated with a low frequency. In

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the attempt to replicate this process an electronic qigong master was build - a simple device generating modulated infrared radiation. This gadget was proven very helpful in some medical treatments and is now commercially available.

Construction of the electronic qigong master was an important link between the phenomena classified, until now, to the realm of magic and the modern science. Obviously, this weak anomalies in the infrared radiation can not account for all the associated effects. It is a firm conviction among the Chinese researchers that the measured part may, at most, constitute a small fraction of *qi*. Experiments conducted with cooperation from Dr. Yan Xin give a good illustration of the unexplained nature of this strange substance.

Dr. Yan Xin

Most of the people with extreme paranormal abilities, like Mr. Zhang Baosheng, are relatively simple and uneducated. The presence of modern scientific equipment easily intimidates them. Even the sight of a video camera (still a very rare and luxurious item in China) distracts them from showing their talents thus forcing the use of a hidden camera. In that respect Dr. Yan Xin is an exception. He has not only distinguished himself in the field of medicine but he is also very cooperative in research

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programs with other scientists.

Perhaps the most spectacular achievement done by Dr. Yan, apart from his healing abilities, were temporary (lasting about 2 hours) alterations of the Raman shift spectra of several samples [3]. The unique aspect of this test was not only that such changes occurred - documenting molecular changes in the samples - but also that they were induced exclusively by the power of will of Dr. Yan (sending qi) from the distance of 2000 km.

Closing remarks

It is a shared opinion among many scientist that modern physics is in an impasse. After a period of fast development boosted by the introduction of theory of relativity and quantum mechanics the progress is slow again. In a search of a major breakthrough physicist have been striving at creating in their laboratories more and more extreme conditions to test the laws of nature and to seek new phenomena. But a straight forward extension of the present line of thinking, although beneficial to our knowledge, can seldom bring a breakthrough. It seems that the clues that we have been looking for in the subnuclear world may have always been there, in our every day life, visible by a naked eye yet unnoticed by scientists.

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Unexplained phenomena were always part of legends and tradition of many peoples around the world. They are also present now but, as a rule, the scientific community preferred to ignore them; usually on grounds of insufficient evidence. We can no longer claim lack of evidence. During the period starting from 1979 until now numerous Chinese physicists, chemists, medical doctors, criminologist, and many others have joined their efforts to document and understand qigong. Among the world class scientists who were the first ones to show the courage to attach their reputation to the research of paranormal abilities and phenomena are Dr. Qian Xuesen (graduate of MIT and Caltech, the founder of China's space and missile technology), Dr. C.Y. Chao (discovery of external $e^+ e^-$ pair production and annihilation processes), and Dr. G. C. Wang (discovery of anti Σ^- hyperon).

With so much evidence of events running contrary to our fundamental knowledge of physics a major scientific effort should be undertaken to study them [13]. It is impossible to summarize in a short article the wealth of solid experimental data on the subject accumulated and published in China over the last decade. Clearly these publications should be translated into English but to justify translations, enough interest must be generated in the scientific community and, most of all, our attitudes must change. We should no longer laugh at the phenomena we fail to understand. When myths and miracles become documented facts they have to be treated as such. "Miracles are not against the nature, they are

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only against our understanding of the nature" [14].

Potential benefits of taping the power of qi are bound to be much more than a next revolution in science. Even now thousands of patients each year, mostly with chronic illnesses, get substantial relief from the hands of properly trained qigong masters. Millions are healthier and feel better through their simple daily practice. Whatever qi is, it works well and, if popularized, it could give to many more people an effective and affordable way to lessen their sufferings.

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